ABSTRACT:

In the invention, an input light including a signal light and a noise light within a signal wavelength band of the signal light is divided into a first component with a polarization parallel to a polarization direction of the signal light and a second component with a polarization orthogonal to the polarization direction of the first component. The first component is supplied into a first arm and the second component into a second arm. The optical phase of the second component in the second arm is shifted so that the optical phase of the second component in the second arm relatively differs by π from the optical phase of the first component in the first arm. The first component output from the first arm and the second component output from the second arm are combined to make the noise lights included in the first and second components interfere with each other.